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CONCEPT AND CHARACTERISTICS OF INFORMATION SOCIETY

КОНЦЕПЦІЯ ТА ХАРАКТЕРИСТИКА ІНФОРМАЦІЙНОГО СУСПІЛЬСТВА

АНОТАЦІЯ. У статті описано передумови виникнення інформаційного суспільства у частині еволюції вимог ринку, складності задач у системах керування, методів формування управлінських рішень, комп'ютерних технологій. Наведено підходи до визначення інформаційного суспільства, його загальна характеристика, характерні риси та особливості. Описано етапи розвитку інформаційних технологій та інформаційних систем керування в інформаційному суспільстві.

КЛЮЧОВІ СЛОВА: інформаційне суспільство, інформація, задача, метод, інформаційна система, ресурс, керування, рішення.

АННОТАЦИЯ. В статье описаны предпосылки возникновения информационного общества в части эволюции требований рынка, сложности задач в системах управления, методов формирования управленческих решений, компьютерных технологий. Приведены подходы к определению информационного общества, его общая характеристика, характерные черты и особенности. Описаны этапы развития информационных технологий и информационных систем управления в информационном обществе.

КЛЮЧЕВЫЕ СЛОВА: информационное общество, информация, задача, метод, информационная система, ресурс, управление, решение.

ABSTRACT. This article describes the preconditions of occurrence of the information society in terms of the evolution of market requirements, complex challenges in control systems, formation methods of administrative decisions, computer technologies. Presents approaches to the definition of the information society, its general characteristics, features and peculiarities. Describes stages of IT development and information systems of management in the information society.

KEY WORDS: information society, information, tasks, methods, information system, resource, management, solution.

Introduction. XX century to the 30s period was the era of mass production, when entrepreneurs tried to produce as much as possible typical products at the lowest price. At the same time, characteristics and product range changed relatively slowly and the internal connections and working conditions within the firms were quite stable.

In the early 30s the demand for basic consumer goods was close to saturation. Demand for standard mass production began to fall and the balance of success began to gravitate toward firms that started to study the needs of the market and began to produce products which meet its needs. Naturally, this has complicated methods of managing the company.

Since the mid-50's has began an accelerated change in the structure, limits and dynamics of entrepreneurship. This period became known as the «post-industrial era», the predecessors of which were the ages of agriculture, industry and the economy of services. It is characterized by rising inflation, increasing restrictions from the state, higher demands of consumers, the invasion of foreign competitors, technological breakthroughs and more.

Technological progress radically changed both demand and supply. Huge investment in scientific-technological research and development generated industries based on new technologies, that put down outdated production. This greatly complicated the monitoring and analysis of the situation on the market, as well as the adaptation of companies to the requirements of the environment.

Due to the emergence of new technologies, unexpected competition, unusual consumers'demands and new requirements of state and social control problems of production and sales become complicated. In accordance with changes in market requirements, the criteria for efficiency have changed: they evolved from production to market. In the post-industrial period, market demand absorbed both of these criteria, becoming market-production.

With the change in criteria tasks of production have changed: stable satisfaction of demand was supplemented by the requirements of market development, use of dual technologies, i.e. technologies that can be used for both military and civilian purposes, limiting production growth, adaptation to globalization of the economy and so on.

The conditions in which the firms functioned also have changed. Unlike the previous period, when firms quite well managed to respond to emerging changes, during this period firms should make serious efforts to meet market demands and prediction of these changes became difficult.

Finally, in the post-industrial era, the changing market requirements are under the influence of scientific and technological breakthroughs of the most advanced firms in their areas, and lagging firms respond to these rapidly changing demands is becoming more difficult. Provide specific new requirements for firms becomes increasingly difficult. Finally, a new kind of industrial product appeared: information and knowledge.

The volume of information that circulate in society began to grow rapidly, prompting scientists to formulate the law of increasing information. It turned out that this law is an exponential function, which allowed to talk about «information explosion». There was a belief that to cope with such an avalanche of information humanity could not. This requires special tools of information processing, storage and use.

The increasing role of information and communication technology implementation in production leads to the formation of a new type of society — information society, basis of which are not traditional material, but intangible, intellectual resources: knowledge, science, organization and human capital.

Problem statement. Today the term «information society» has already been established and widely used. «Speaking about the level of its development, we can talk about the development level of public information space, which has a decisive influence on the economy, defense capability, politics, elements of statehood, etc.» [1, p. 17].

There are three approaches to determine the nature of the information society – American, Japanese and European.

The criterion of the first approach is the economic component – the share of information (intangible) sector in the growth of gross domestic product. The second approach is based on the theory of «information explosion», according to which the amount of information available to the public increases exponentially, leading to a qualitative change in the economy — the information society. In the third approach, the main characteristic of the information society — the spread of information and communication technologies. It is clear that the fundamental definition of information society should reflect all three approaches.

In the literature there are various definitions of information society:

information society — concept of postindustrial society; a new historical phase of the development of civilization, in which the main products of production are information and knowledge [2];

information society is a sociological and futurological concept that determines the main factor in the development of society, this is production and use of scientific, technical and other information [3];

information society – a society in which the majority of workers employed in manufacturing, storing, processing and sales information, especially its higher form – knowledge [4];

information society – a society with a high level of information intensity in the everyday life of citizens, organizations and businesses using public information and communication technologies for a wide range of people and the possibility of fast transfer, receive and exchange of digital data regardless of distance [5];

information society – a society in which most people employed in manufacturing and information services, provided access to any member of the society in any part of the territory and at any time to the needed information, which is the most important strategic resource of society [6].

These and other interpretations of the term «information society» united by the fact that the main resource of the society is information, that is information resource.

Analysis of studies and publications on the problem. The urgency of the problems of development of information society attracted considerable interest among many scientists. Among them we should highlight D. Bell, V. Glushkov, W. Martin, F. Mahlupa, E. Toffler, E. Trahtengerts and others.

D. Bell [7] proposed the concept of the information society on which crucial for the economic and social life, to methods of production of knowledge, and to the nature of employment rights becomes formation of a new structure based on telecommunications. He believes the revolution in organizing and processing information and knowledge takes place simultaneously with the development of industrial society. In order to understand this revolution, three aspects of the latter are especially important. This refers to the transition from an industrial society to services crucial for the realization of scientific knowledge and technological innovations transform new «intellectual technology» key tool in system analysis and decision theory formation.

American expert F. Mahlup [8] in the early 60-th century stressed that information could be considered as a kind of industrial product and its production – one of the types of industrial industry. The same wrote later V. Glushkov [9], who proposed the concept of paperless technologies in organizations of the sector of management and distribution in society.

W. Martin [10] believes that the information society can be defined as a society in which quality of life as well as prospects for social change and economic development in the growing dependent on information and its use. In such society the standarts of life, forms

of work and rest, the education system and the market are strongly influenced by advances in information and knowledge.

According to E. Toffler [11], the concept of the information society is not unique. In the pure form, the information society does not exist anywhere in the modern world, and its appearance in the future is unlikely. Rather, it is a new stage («wave») of industrialization, that gave rise to the industrial-information society, in which there is a parity between new and traditional values and social mechanisms. Information society — a new form of civilization, which generates a current structure and relevant socio-political mechanisms to solve problems associated with the development of information technology industries. Many of these mechanisms are in secret form and require adequate analysis and critical evaluation.

E. Trahtengerts identifies the following distinctive features of the information society as «the growing role of information and knowledge in society, the growing share of information communications products and services in gross domestic product, creation of a global information space» [1, p. 17].

However, many developments in this area are far from complete. In particular, there is a need to set out in a detailed and expanded concept of the information society and its characteristics as a new formation.

The purpose of the article is to determine the preconditions for the emergence of the information society and the presentation of its concept, general characteristics, distinctive features and characteristics.

Presentation of the main material. The structure of the information society is more complex than the structure of the previous societies, since the main part of this society — computer communications — is not an independent production unit, but is a product of a specific industry. In this sense, the concept of the information society should indicate the specific characteristics that fully reflect the essence of the social system.

Characteristic features of the information society are:

the problem of the information crisis is solved, that is, there is no contradiction between the information avalanche and information hunger;

priority of information is provided in comparison with other resources; the main form of development is the information economy;

the basis of society is the automation of the generation, storage, processing and use of knowledge with the help of the latest information technologies;

information technologies become global in scope, covering all aspects of human social activity;

informational unity of all human civilization is formed;

with the help of computer science is realized the free access of everyone to the information resources of the entire civilization;

implemented humanistic principles of management of society and the impact on the environment.

Distinctive features of the information society are:

growing role of information, knowledge and information technology in society;

increase in the number of people employed in information technology, communications and production of information products and services in gross domestic product;

the growth of information society using telephony, radio, television, the Internet, as well as traditional and electronic media;

creation of a global information space, that provides: effective information interaction of people, their access to world's information resources and satisfaction of their needs in information products and services.

Speaking about the changes and improvements, which contribute to modern society in a qualitatively new stage – the information society, supporters of its concept are based on objective processes of high technology, energy and labour-saving industries, robotics manufacturing processes, computerization and informatization of the most important areas, social and political life. And, indeed, at this time of the latest high-tech components and energy-saving technology solution society depend on such vital issues as economic growth, employment, higher living standards and more. They need a detailed study of the diversity and functioning principles of modern society, raising fundamental questions about social and political change that brings with it the introduction of information technology. This affects the future of social and historical development of humankind, the destiny of person, person's place and role in this process.

In light of these changes U. Martin formulated the main characteristics of the information society with the following criteria:

technological: the key factor — information technology, which is widely used in production, institutions, education and at home;

social: information serves as an important stimulus to change the quality of life, is formed and affirmed «information consciousness» with broad access to information;

economic: information is a key factor in the economy as a resource, service, product, source of added value and employment;

political: freedom of information is leading to a political process characterized by growing participation and consensus among different classes and social strata of the population;

cultural: recognition of the cultural value of information by promoting the adoption of information values for the development of an individual and society as a whole.

At the same time, Martin especially emphasizes the idea that communication is a key element of the information society. He emphasizes that, speaking of the information society, it should not be perceived in the literal sense, but rather as a landmark, a tendency for change in modern society. According to him, in general, this model is focused on the future, but in developed countries can already be called a number of changes caused by information technology, which confirm the concept of the information society.

Among these changes, Martin lists the following:

structural changes in the economy, especially in the division of labor;

increasing awareness of the importance of information;

growing awareness of the need for computer literacy;

wide spread of information technology;

government support of computer microelectronic technology and telecommunications.

In the information society knowledge and superiority in possession of information is an important social and economic force that contributes to the redistribution of economic, social and political resources. However, one must realize that the information society poses new, more complex than in previous stages of its development problems, its solution requires the development of new methods of forming solutions (table 1) [1].

In addition to difficulties caused by market demands and dynamics of environmental problems, management complications and automation management problems, companies having difficulties caused by the development of their internal structure. They are defined by the following aspects [12]:

spatial distribution of managerial, production, warehouse and other divisions of the organization;

greater volume of information characteristic clientele flow of material and financial resources, the state of production processes, performance and competition policy, etc;

the need to analyze real-time monitoring results on all important activities and identify possible threats;

formation of operational management decisions in real time or close to it;

gap analysis between the parameters purposes (plans), stages of their achievement and actual performance;

the need to assess the risk of loss and finding ways to prevent them;

the formation of agreed changes in the goals, strategies and plans at a pace that ensures the parison of the threats;

control over the implementation and effectiveness of decisions on operational management and changes in strategies in accordance with the timing of their implementation;

the need to take into account information influences and the implementation of information management.

Table 1

EVOLUTION OF COMPLEXITY OF TASKS IN CONTROL SYSTEMS

Industrial revolution	Mass production	Postindustrial period	Information period
Initial elements of monitoring and analysis of the situation Formation of purpose Establishment of industrial structures Definition of functions Production and services	Development of monitoring and methods of analysis of the situation Complication of goals Development of production structures, creation of laboratories for scientific research Development of new technologies Formalization of functioning procedures Development of types of productions and services	Creating advanced monitoring structures and methods of analysis of the situation with the use of computers Computerization management Further complication of the goals and strategies of their implementation Creation of corporations, holdings, scientific organizations Optimization of the functioning of activities Diversification of production and services, production of innovative products	Creating individual units of information management in firms Creation of automated analysis of mass media Computerization of information management The appearance of informational purposes and strategies Optimization of information management methods Diversification of information management methods

The complication of the tasks led to the need for the development of appropriate mathematical methods for optimizing managerial decisions that make it possible to determine the best of their variants in the given resource, environmental, social and other constraints. Therefore, developing a powerful economic and mathematical methods by which you can not only find the optimal solution for a given input data, but also where the most varied raw data into

finding the best starting conditions. The wide applicability of these methods has arisen in connection with intensive introduction of computer technology in the control system of corporations, companies and other types of organizations in the second half of the twentieth century.

Managing the company in an extremely changing information society in a context of harsh competition and increasingly complex marketing, manufacturing and economic processes became impossible without the use of computer facilities. It is hard to imagine organizational system, which in any form would not use computing systems to solve management problems. An illustration of this is the scheme of computer's processing received information in the company (Fig. 1). It shows the possibility of using computer technology to implement the tasks of decision-making in the information society.

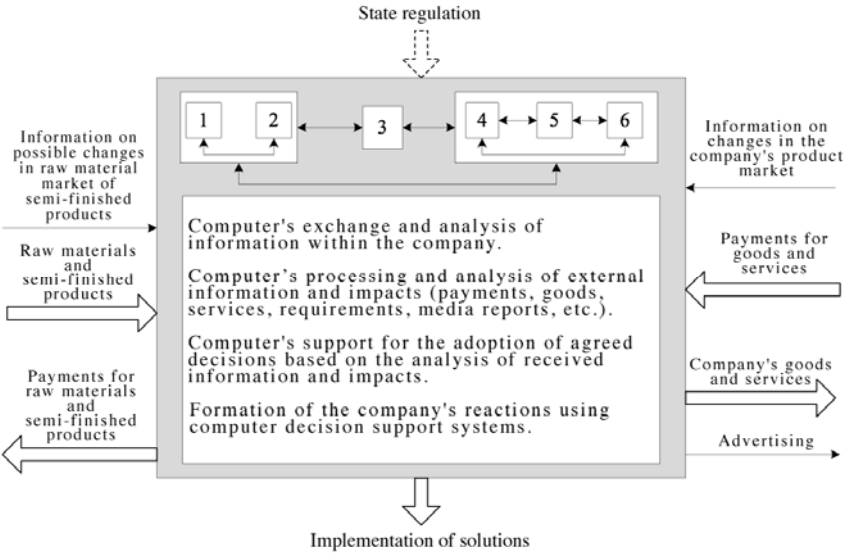

Fig. 1. Scheme of computer's data processing

In fig. 1 the following designations are taken: 1 – sales department; 2 – financial department, 3 – accounting department, 4 – contract department, 5 – warehouse, 6 – production workshop. The remaining units are not marked. A single arrow shows the information, double – impacts on the firm and by the firm.

The use of computer systems to control problems generated two mutually penetrating processes:

complexity of controled problems, increased requirements for computer systems'hardware and software;

computing complexes that are used in control systems have an increasing influence on the structures and methods of managing firms.

The first computer management systems were created as a system-advisers. They accumulated received information, processed it and provided the managers and experts with the results of this processing. In some systems, based on the obtained data, managerial decisions were formulated by the expert or supervisor themselves, in other management systems they generated decision variants, and the manager chosed the decisions that he considered the best. These were variants of systems of varying degrees of difficulty, which in the 70s of the twentieth century were called decision-support systems (DSS).

The task of the DSS is to assist the leader in the decision-making process and includes the following functions:

1) identification, ranking priorities and count uncertainty in manager's assessments;

2) understanding and evaluation of the current situation and restrictions imposed by the situation (analysis of monitoring results);

3) generate a list of alternative management decisions;

4) evaluation of possible alternatives, based on manager's benefits and restrictions imposed by the current situation;

5) analysis of the consequences (forecast) of the results of the decisions;

6) support for negotiations while forming a coherent group decision;

7) choosing the best option as the Head.

The next step in the development of computer technology became Decision Making Systems (DMS), which features DSS transforms as follows:

1) the role of function 1 increases, as in the development of algorithms for forming solutions and evaluation situations manager's benefits should be laid and uncertainties counted in its evaluation;

2) computer system will analyze and evaluate the objective component;

3-5), these functions remain unchanged, but the system performs them independently;

6) this function is implemented in the process of reconciling the solutions proposed by the subsystems of the distributed complex (if

any) based on the estimates and identified advantages during the implementation of function 1;

7) this function is to select and implement a computer control system of the best option based on the identified benefits during the implementation of function 1.

Finally, the next step was the creation of computer systems that form not only the decision, but also the managerial influence, control their effectiveness and monitor.

These systems are called computer control systems and perform the following functions [13]

1) the formation of goals, strategic and operational decisions in which performed:

analysis of monitoring results;

formation of strategic and operational actions and their implementation;

determination of the effectiveness of operational impact on the implementation of the chosen strategy;

assessing the success of the strategy in achieving the goal and ensuring security measures;

change of strategy in case of impossibility to achieve the goal with the help of the chosen strategy, as well as the threat to the safety of production or the environment;

change objectives in case of changing conditions, including environmental, such that achieving this goal is still unrealistic. The solving of these tasks is carried out by algorithms implemented by the programs of the computer control system according to the criteria agreed upon by the managers and experts and introduced into the system;

2) the connection between the goals, strategies and operational activities through the following tasks:

character formation of strategic decisions that carry out performance goals for existing restrictions;

formation of parameters of strategic decisions on the basis of evaluations of efficiency of operational actions;

identification of actions based on assessments of the effectiveness of implementation strategies;

modification of goals, strategies and operational actions depending on the effectiveness of their implementation;

3) organization of the interaction of two components of the human-machine system – computer and manager (expert, operator). In order for the manager to demonstrate his art of using computer control systems in the formation of managerial decisions, they should include special software and hardware that allow to implement methods to

identify, adapt and implement subjective preferences of managers, as described above, and contribute to solving the following tasks:

identification of manager's preferences;

assisting the manager in the analysis of the objective component, including in understanding and assessing the current situation and restrictions imposed by the external environment and the state of the firm;

formation of possible managerial decisions;

evaluation of alternatives, based on the manager's preferences and the constraints imposed by technology and market requirements;

impact analysis (forecast) of the results of the decisions;

support for negotiations while forming a coherent group decision.

Analysis of the effectiveness of operational actions implemented strategies accuracy and degree of success of the goal carried out by different criteria, but in parallel, ensuring implementation of the relationship at all three levels: operational management, strategic management, goal. The scheme of realization of these functions is shown in Fig. 2

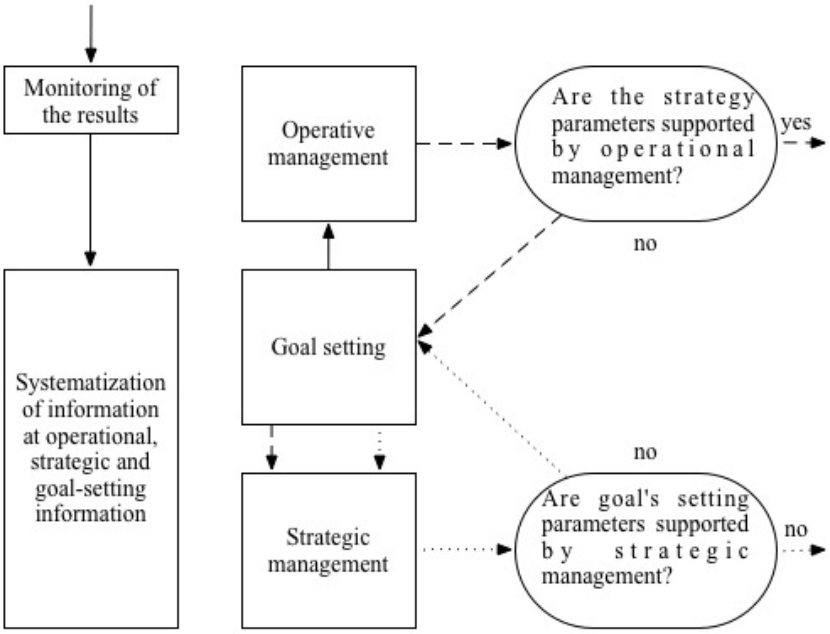

Fig. 2. Scheme of a computer's control system

Fig. 2 shows that structural modern computer control system consists of three interconnected subsystems operating in parallel: operational management, strategic management, and goal setting. This system operates in cycles: the formation solution can be repeated if the proposed option appears unsatisfactory. Of course, it is not necessary to have a computer management system implemented in all the blocks shown in Fig. 2. In many cases, they are only partly implemented.

The emergence of the information society has created an information management (information management) — a new method of management in conflict situations, which has unusual ethical norms and means of influence. As the opponent is considered any government, political, economic and other structures or individual whose actions are contrary to the objectives of an organization that provides information influence.

Information management is a complex of measures on creation and implementation of management decisions, in which management's impact is implicit, indirect. Managed object provides information on the current situation, which is determined by the governing body. However any other information is not available to him. In these circumstances, the object has to choose a course of action, focusing mainly on this information, and thus impose goals that are beneficial to the governing body.

Information management and its implementation in the form of information actions carried out by a particular algorithm. Implement it – it means to choose the input data for the object, which exert influence to:

activate in it operation algorithms needed for governing facility to achieve their goals;

in the absence of the structure of the controlled object such algorithms, activate the means of their creation.

Information management advantages are:

high selectivity of influence;

concreteness and efficiency;

rapid reorganization of methods and means of influence, depending on the changing environment;

the possibility of rapid focusing on a particular object;

the possibility of comprehensive use of various methods and tools for information management;

relatively small costs for the formation and implementation of managerial decisions.

Unlike technical objects control systems in the management information systems should be taken into account, that they not only can affect other systems, but themselves can be exposed to information influences.

In the process of formation and development of the information society a number of new terms arose:

information culture — part of common culture focused on information support of human activity, which reflects the achieved levels of organization of information processes and the effectiveness of creating, collecting, storing, processing, presenting and using information, providing a holistic vision of the world, its modeling, prediction of the results of formed decisions;

information technology — purposeful organized collection of information processes using computer technology, providing high speed data processing, quick search of information, dispersal data, access to sources of information regardless of their location;

information production — the process of human action on information (subject of labor) with means (tools) of labor in order to obtain new information (product of labor), necessary for the creation of material, spiritual and other values that ensure the existence and development of human and society;

information economy (network economy) — economy, in which most of the activities provided by the GDP from the production, processing, storage and dissemination of information and knowledge;

information resources — documents and arrays of documents in information systems (libraries, archives, funds, data banks, etc.);

information service — obtaining and providing at the disposal of user's information products;

information product — documented information prepared in accordance with user's needs and presented in the form of goods (software, databases and data banks and other information).

These terms describe different aspects of the information society.

Conclusions.

Information society — a new form of civilization, which generates a current structure and relevant socio-political mechanisms to solve problems associated with the development of information technology. Many of these mechanisms are in the form of covert and require adequate analysis, critical assessment, improvement and development.

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